

VARIABLE VIRULENCE AND GENETIC DIVERSITY IN *FUSARIUM OXYSPORUM* FROM SUGAR BEET.

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ABSTRACT

Fusarium yellows of sugar beet can cause reductions in root yield, reduce sucrose percentage and lower juice purity. The primary causal agent is *Fusarium oxysporum* f. sp. *betae* (FOB). Some strains of FOB also are able to infect spinach and some weed species, therefore, FOB may have a less restricted host range than is reported for many *formae speciales*. We investigated the variability in strains of *F. oxysporum* isolated from sugar beet from seven states in terms of their pathogenicity and virulence on sugar beet in greenhouse tests, and their variability in RAPD banding patterns as a measure of their genetic diversity. Five-week-old beet plants (*Fusarium*-susceptible line FC716) were inoculated by dipping clipped roots in spore suspensions of the different isolates for 8 min. Approximately 10^4 spores per milliliter, mostly macroconidia, were used for inoculations. From a total of 98 isolates collected on sugar beet, 30 were pathogenic on sugar beet and 26 were identified as FOB. These pathogenic isolates were from three states within the U.S., Colorado, Montana and Oregon. One isolate each of *F. solani*, *F. moniliforme*, *F. avenaceum* and *F. accuminatum* also was pathogenic in our greenhouse assay. *Fusarium accuminatum* has been reported to cause yellows symptoms, but the other species have been associated with seedling disease, root rot, or postharvest symptoms, rather than wilt or yellows. Here we report on twelve isolates of FOB, which were analyzed by randomly amplified polymorphic DNA (RAPD) analysis using nine primers. Based on RAPD patterns, seven isolates of FOB from Colorado clustered together, but some non-pathogenic isolates clustered with the FOB strains. FOB strains from Montana and Oregon showed divergent patterns. Some clustered with non-pathogenic isolates, but one isolate from Montana was highly divergent from all other isolates tested. Thus FOB appears to be a diverse group within *F. oxysporum*.

When a subset of isolates were inoculated onto a set of sugar beet varieties with reported resistance to *Fusarium* yellows, some isolates gave different reactions among the varieties. This may indicate the existence of races within FOB. Further research with additional *Fusarium* isolates from different regions, and with genetically characterized sugar beet lines (i.e., the source used to obtain the *Fusarium* yellows resistance) would help to clarify this situation.